



Climate change and food security in tropical West Africa - A dynamic-statistical modelling approach

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Abstract:

The relationships between climate and agricultural production in Benin, tropical West Africa, are elucidated using predictions from a high-resolution regional climate model. The aim is to detect the sensitivity of various mainly alimentary crops cultivated in tropical Africa to changing climate conditions due to increasing greenhouse-gas concentrations and ongoing land degradation. This knowledge is of practical relevance since the predominant cultivation of less vulnerable crops may be an appropriate adaptation strategy in order to maintain or improve food security in Africa. Model output statistics are used to transfer simulated climate variability to changing crop yield. It turns out that the statistical relationships between climate and agricultural production are very strong, amounting in part to more than 50% of explained variance at the interannual time scale. Especially summer monsoon precipitation and relative humidity represent reliable predictors of crop yield. Until 2025, the dryer and warmer climate in tropical Africa may come along with a decrease in agricultural production with respect to most crops. The reduction is in the amount of 5 to 20%, implying severe problems of food security given the increasing population density. However, yams and manioc, as major alimentary crops in Benin, appear to be less sensitive to climate change.

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Resource Description

Climate Scenario :

specification of climate scenario (set of assumptions about future states related to climate)

Special Report on Emissions Scenarios (SRES)

Special Report on Emissions Scenarios (SRES) Scenario: SRES B2

Exposure :

weather or climate related pathway by which climate change affects health

Ecosystem Changes, Food/Water Security, Meteorological Factors, Precipitation

Food/Water Security: Agricultural Productivity

Geographic Feature:

resource focuses on specific type of geography

Climate Change and Human Health Literature Portal

Tropical

Geographic Location: ☒

resource focuses on specific location

Non-United States

Non-United States: Africa

African Region/Country: African Country

Other African Country: Benin

Health Impact: ☒

specification of health effect or disease related to climate change exposure

Malnutrition/Undernutrition

Mitigation/Adaptation: ☒

mitigation or adaptation strategy is a focus of resource

Adaptation

Model/Methodology: ☒

type of model used or methodology development is a focus of resource

Exposure Change Prediction

Resource Type: ☒

format or standard characteristic of resource

Research Article

Timescale: ☒

time period studied

Medium-Term (10-50 years)

Vulnerability/Impact Assessment: ☒

resource focus on process of identifying, quantifying, and prioritizing vulnerabilities in a system

A focus of content